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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|-----------------------|---------------------|------------------|
| 09/779,123 | 02/07/2001 | Anantha R. Sethuraman | 5298-02501 | 9269 |

7590

07/03/2002

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EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 09/779,123 | | SETHURAMAN ET AL. | |
| | Examiner | | Art Unit | |
| | Hsien-Ming Lee | | 2823 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3, 4</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. Figures 1-4 should be designated by a legend such as --Prior Art--. Particularly, the brief description of drawings indicates that they are from the conventional techniques. See MPEP § 608.02(g).

Claim Objections

2. Claims 2-8, 10-16, 18-20 are objected to because the lines are too closely together, making reading and entry of amendments difficult. Substitute claims with lines one and one-half or double spaced on good quality paper are required. See 37 CFR 1.52(b).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, at lines 10-11, the limitation “ from of electrically conductive features of an ensuring integrated circuit” is not well understood.

5. Claim 2, at line 18 and claim 10, at line 22 recites the limitation "**said** group consisting of . " Claim 7, at line 37 and claim 15, at line 3 recites the limitation "**the** group consisting of .” There is insufficient antecedent basis for the limitation in the respective claim.

6. Claim 1, at line 9; claim 3, at line 22 ; claim 11, at line 26 and claim 17, at line 9, recite the limitation “ said wide and narrow trench.” There is insufficient antecedent basis for the limitation in the respective claim because “ relatively wide” (e.g. claim 1, line 4) is not equal to “ wide” (claim 1, line 9).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jaso et al. (US 6,093,631) in view of applicants' admitted prior art (AAPA), including pages 1-6 and Figs. 1-4.

With respect claims 1, 3, 9, 11, 17, 21 and 22, Jaso et al. teach a method , comprising :

- etching a plurality of laterally spaced dummy trenches 20 into a dielectric layer 14 between a first trench 15d and a series of second trenches 15a/15b/15c (Fig. 11B);
- filling the dummy trenches 20 and the first 15d and the series of second trenches 15a/15b/15c with a conductive material 16 (Fig. 11C); and
- polishing the conductive material 16 to form dummy conductors in the dummy trenches 20 and interconnect in the first trench 15d and the series of second trenches 15a/15b/15c, wherein the dummy conductor are electrically separate from the plurality of electrically conductive features and co-planar with the interconnect.

Jaso et al. do not teach that the first trench is a relatively wide trench and the series of second trenches are relatively narrow trenches. AAPA, however, in an analogous art teaches forming a relatively wide trench 24, a series of relatively narrow trenches 22 (Fig. 2); filling the relatively wide trench 24 and the series of relatively narrow trenches 22 with a conductive material 28 (Fig. 3); polishing the conductive material 16 to form conductors in the series of relatively narrow

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trenches 22 and interconnect in the relatively wide trench 24, wherein a common dishing problem occurs at the upper surfaces of the conductors and the interconnect due to the presence of a dense material (dielectric layer 20) between the conductors and the interconnect.

Therefore, at the time of the invention was made, one artisan in the art would have been motivated to apply the method of Jaso et al. to solve the dishing problem as demonstrated by AAPA, wherein the relatively wide trench 24 of AAPA can be treated as the first trench 15d of Jaso et al. and relatively narrow trenches 22 can be treated as the second trenches 15a/15b/15c of Jaso et al. The motivation/suggestions by doing so would be to apply the method of Jaso et al. to solve the dishing problem after polishing the conductors (narrow ones), the interconnect (wide one) and the dielectric layer existing between the conductors and the interconnect as shown in AAPA, i.e. to make the upper surfaces of conductors, the interconnect and the dielectric layer to be substantially coplanar as shown in Fig. 11D of Jaso et al.

Regarding claims 2, 10, 19 and 20, Jaso et al. teach that the conductive material comprises a metal , which can be a conventional metal such as Al, W, Ta or Ti, as evidenced by AAPA (page 3, lines 24-25).

Regarding claims 4, 12 and 18, the combination of Jaso et al. and AAPA teaches the polishing resulting in dummy dielectric protrusions between adjacent pairs of the dummy trenches, the dummy dielectric protrusions having first upper surfaces substantially coplanar with second upper surfaces of the dummy conductors.

Regarding claims 5-8, 13-16, Jaso et al. teach that the polishing comprises applying a polishing solution; applying an abrasive polishing surface to upper surface of the conductive material while moving the abrasive polishing surface relative to the upper surface, wherein the

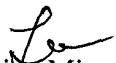
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abrasive polishing surface comprises particles partially fixed into a polymer-based matrix and the particles comprises aluminum oxide or silicon dioxide (col. 1, lines 37-61).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-0142 for regular communications and 703-305-0142 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Hsien Ming Lee
June 27, 2002


SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER